CHAPTER C23

HAZARDOUS MATERIAL CONTROL AND MANAGEMENT STANDARDS

C2301. DISCUSSION

a. Hazardous material control and management (HMC&M) standards address the storage, use, and disposal of all hazardous material (HM). The information in this chapter provides the detailed guidance that ships need to properly manage and control HM. It implements the considerations contained in Chapter B3.

b. Special precautions are required for the stowage, handling, and use of HM aboard ship. Significant hazards include fire, poisoning by breathing toxic substances in unventilated spaces, dermatitis, asphyxiation, and burns of the skin and eyes. This chapter contains specific management guidance and precautions for stowage and use of all HM, precautions for subcategories of HM (flammable materials, toxic materials, corrosive materials, oxidizers, aerosol containers, and compressed gases), and specific precautions for selected materials. Chapter B3 describes HM emergency response and training requirements.

C2302. GENERAL HMC&M STANDARDS

a. **HM Requisitioning**

(1) Before ordering any HM, ships shall determine that a valid requirement exists. The Ships Hazardous Material List (SHML) provides the requirements for shipboard HM. Ships shall order only material allowed by this document, unless otherwise specifically authorized by the commanding officer (or other designated officer O-5 and above).

(2) If a HM minimization center (HAZMINCEN) is in operation, this center shall requisition all HM (including HM storage containers) with a SHML Material Management Indicator (MMI) of "Y". HM items with a SHML MMI of "N" may be requisitioned by individual workcenters.

NOTE:

Some hazardous material may not pose a significant safety or health hazard to users. Other HM may be used by a specific workcenter with the required knowledge of the material and for which centralized control is unnecessary. These materials are not required to be requisitioned, received, and issued from the HAZMINCEN and are identified by MMI of "N" in the SHML. Those items with a MMI of "Y" should be managed by the ship’s HAZMINCEN.

b. **SHML**. The SHML is a record of the HM authorized aboard U.S. Navy surface ships. The SHML provides surface ships with the ability to determine HM authorized and preclude stocking of dangerous material for which the ship has no use. For ease of use, the SHML is provided quarterly on the DoD's CD-ROM, *Hazardous Material Control & Management/Hazardous Material Information System (HMC&M/HMIS)*. The SHML can be searched using FSC, NIIN, nomenclature, or part number. Each SHML item is marked with a HM use category in the Allowed Onboard data field. The Naval Supply Systems Command working with the technical systems commands assigns these use categories based on a technical and safety and health assessment of the product. These use categories are:

(1) **Allowed (A)**. No restriction on use of this HM on surface ships.

(2) **Prohibited (P)**. HM not allowed aboard surface ships and cannot be requisitioned.

(3) **Restricted (R)**. HM not allowed aboard surface ships except with specific restrictions.

(4) **Obsolete (O)**. HM that is obsolete and in most cases no longer procurable.

(5) **Not Determined (N)**. HM that is under review for authorization for use afloat. This HM shall not be issued or used unless/until it is validated as necessary and action is taken to add it to the SHML.

Equipment and tasking vary among ships within a single type, and configurations of individual ships may vary over time. If a ship has identified a valid requirement for an HM, and that material is either not listed in the SHML or is listed with a P or N, personnel shall complete a SHML Feedback Report (SFR). They may generate this report using Hazardous Material Inventory Control System for Windows (HICSWIN) or Standard Automated Logistics Tool Set (SALTS) software and submit it to the Naval Inventory Control Point (NAVICP) Code 07122, notifying the appropriate type commander and procurement department. NAVICP will screen and flag SFRs for technical commands, which will provide a response within 48 hours of submission via SALTS. If SALTS is unavailable, reference C23-6 provides a hard copy SFR format.

NOTES:

1. The fact that a HM is listed in the SHML does not in itself prove a "valid need" for a given ship to have that item aboard. No ship will have a valid need for all items in the SHML. Each ship must assess its own needs, using the SHML as a guide.

2. Subsets of the master SHML tailored to individual ship types (Type-SHMLs or T-SHMLs) shall be used by ships for which they are available. T-SHMLs have been built into HICSWIN as the authorized use list for each ship. T-SHMLs are updated monthly and placed in a downloadable repository SALTS for use in updating the HICSWIN T-SHMLs. Ships of a type not covered under the existing T-SHMLs shall use the master SHML as their authorized use list.

c. **HM Open Purchase.** Navy policy is that, to the maximum extent feasible, ships shall only procure and use standard stock HM.

(1) In **the exceptional case** for which the stock-numbered product can be clearly demonstrated to be inferior, or due to the urgency of need cannot be satisfied from supply system stock, commanding officers may justify and authorize open market purchases of HM for those items. The SFR, when completed and signed by the commanding officer (or a designated officer O-5 or above) and attached to the purchase request, shall be used as the required certification. The ship shall obtain an MSDS from the manufacturer or supplier prior to approval of a new product for purchase or use and retain the MSDS aboard. An SFR with the HMIS MSDS number shall be submitted via SALTS to
R) NAVICP Code 07722, notifying the appropriate type commander and procurement department. If no MSDS number is available in HMIS, submit a hardcopy of the MSDS to NAVICP Code 07722.

(2) If ships or other commands are approached by commercial vendors offering HM not listed in the SHML for shipboard use or for substitution for stock-numbered HM, they shall refer vendors to NAVICP, Code 07122.

d. **HM Receipt**

(1) The supply department shall check all containers of HM obtained through open purchase upon receipt to ensure that they contain a manufacturer's label as described in paragraph C2302e. They shall refuse a container not so marked.

(2) When HM containers are accepted and brought aboard, they shall be immediately placed in an appropriate stowage location based on the hazard associated with the product.

(3) If a HAZMINCEN is in operation, the HAZMINCEN shall be the receiving point for HM that was requisitioned by, and will be issued from, the HAZMINCEN. This will allow HM data to be entered into the HICSWIN software. HM with a SHML MMI of "N" may be received from supply by the requisitioning workcenter.

e. **Container Marking**

(1) Manufacturer's labels for shipboard identification of HM containers must clearly identify the material name, the manufacturer's name and address, and the nature of the hazard presented by the HM including the target organ affected by the material. A manufacturer's label may be a tag, sign, placard, or gummed sticker. When dispensing HM from the shipping container to another container, personnel shall annotate the receiving container to indicate the material name, manufacturer name and address, and the nature of the hazard (including target organ) as specified by the manufacturer to preserve the continuity of information. To mark unlabeled containers, tanks, or containers where the label has been destroyed or damaged, ships may use the Department of Defense (DoD) Hazardous Chemical Warning Label, DD 2521 or DD 2522. HMIS provides this label and label information at the end of each MSDS. Personnel can print the label on plain paper or the pre-printed color forms: DD 2521 (8.5"x11") (S/N 0102-LF-012-0800) or DD 2522 (4"x7") (S/N 0102-LF-012-1100). If the material is used and not in its original container, the HAZMINCEN (work center) shall ensure that the material is labeled as required above. In addition, a label identifying the material as used HM (see appendix C23-B) shall be completed and attached to the container. This label shall contain information on the process in which the material was used (e.g., used spring bearing lube oil, circuit board cleaning solvent, dried out epoxy paint, etc.). It will also identify any known impurities that the material might contain based on routine PMS analysis (e.g., Naval Oil Analysis Program (NOAP) test results) and any special storage requirements. This information is necessary to assist the shore activity in properly storing the used HM and filling out disposal documents if the material is processed as waste.

NOTE:

If the material is transferred into a small container, such as a dropper bottle for boiler water chemistry, and insufficient room exists to place the required information on the label, the label shall at a minimum contain the material name, manufacturer's name, and stock number. The ship shall provide the remaining information on a card in a location known to users, that is in close proximity to the container, so that it can be readily referenced. In addition, supplemental label information shall be cross-referenced to the smaller container, using numbers or letters (e.g. MSDS serial number).

f. **HM Issue**. Only limited quantities of HM essential for immediate needs during a work shift shall be issued from flammable liquid storerooms or other issue rooms. Generally, less than a 7-days supply of each routinely-used item

shall be in or near the user compartment for HM issued from the HAZMINCEN (SHML MMI of "Y").

g. **Collection And Offload Of Used Or Excess Hazardous Material**

(1) Control of shipboard used or excess HM is an important element in the Navy's comprehensive HM management effort. Ship's force shall carefully follow the practices delineated for shipboard HM disposal and off-loading to minimize workload and allow full compliance with applicable regulations. Supervisors must emphasize to all hands that they must control and offload rags, protective clothing, empty containers, and items used in spill response contaminated by hazardous substances with the same precautions as applied to all other HM. Reference C23-1, appendix L provides guidance for the transfer and disposal of used HM. The requirements detailed below shall not preclude the overboard discharge of HM during an emergency where failure to discharge would clearly endanger the health or safety of shipboard personnel or would risk severe damage to the ship.

(2) Ships shall exhaust all beneficial uses from a HM prior to transfer or disposal. This action includes increasing the useful life of the material by extending the shelf life per approved procedures outlined in reference C23-2 or redistribution within the ship for reutilization.

(3) **Collection of Used HM**. Appendix L of reference C23-1 and Maintenance Requirement Cards (MRCs), as applicable, provide guidance for determining which types of used HM must be collected and held for treatment by shore disposal facilities.

(a) Ships shall **segregate** collected used HM. They shall normally fill a container with one type of HM, i.e., all the used HM in a container shall normally be of only one stock number. They shall place used HM either in the container for the original material or in an impervious container specified in appendix C23-A. The container shall be securely sealed using the installed or provided closure devices to ensure the container does not leak during transportation. The container shall be properly labeled (refer to paragraph C2302e for labeling requirements) to indicate content, and stowed in appropriate locations following the stowage precautions in this chapter for comparable HM.

(b) If the contents of a HM container are unknown, the label must state so, and fleet accounts must pay the costs of chemical analysis to determine specific content. The workcenter originating the HM for offload shall provide any useful information in identifying the origin or composition of the material in the container. If the contents are unknown and the originating workcenter can determine by experience that the material is flammable or combustible (the most common type of HM aboard ship), reactive, toxic, or corrosive, they shall supply that information on the container to allow proper stowage aboard ship and at the receiving shore activity.

(c) Specific procedures for oil pollution abatement, including requirements for segregation of oily wastes, used oil, and waste oil are found in Naval Ships Technical Manual, Chapter 593, "Pollution Control." Ships equipped with oily waste holding tanks (OWHT) shall direct all shipboard oily waste to the OWHT. They shall collect used lube oils separately and store and label for eventual shore recycling. They shall also collect synthetic lube oils and hydraulic oils separately from other used/waste oils. Ships that do not have a system dedicated to the collection of used synthetic oils shall use epoxy-lined steel containers, properly labeled, for eventual shore recycling.

(4) **Procedures for Off-Loading Used or Excess HM to a Naval Shore Activity**. The HM supervisor shall receive and consolidate all used HM for

offload. The HM supervisor shall turn over used or excess HM to the shore facility Hazardous Material Offload Team (HOT), normally the local fleet and industrial supply center (FISC). Ships that have a HAZMINCEN aboard shall use the HAZMINCEN as the collection point for all used HM.

(a) **Processing Used HM**

1. The HAZMINCEN (or workcenter generating used HM for ships not having a HAZMINCEN) shall ensure that HM is properly packaged in the original container or in a container specified for the material in appendix C23-A. If any questions exist regarding the integrity of the original container (e.g., badly rusted, badly dented, or poorly sealed), the contents shall either be transferred to a new container or the HAZMINCEN/workcenter shall place the damaged container into an "overpack" container (a steel drum with removable cover (see appendix C23-A)). The overpack container shall be filled with sorbent material to absorb possible leaks and prevent movement of the original container within the overpack container. Refer to paragraph C2302e for labeling requirements.

NOTE:

Label or mark overpack containers regarding orientation to prevent spills if the container were improperly stored or transported.

2. The HM supervisor shall ensure that a DD 1348-1 or DD 1348-1A is prepared for each container of used HM. Clearly identify the following information (where known) on the DD 1348-1 or DD 1348-1A: the NSN, the material name, and the manufacturer's name and address. The individual filling out the DD 1348-1 or DD 1348-1A shall properly label the container with information required by paragraph C2302e including the Used Hazardous Material label (see appendix C23-B).

(b) **Transferring Used HM Ashore**

1. The ship's point of contact shall contact the shore activity HOT point of contact to request a pick-up and ascertain local requirements. These requirements may be obtained from shore activity instructions, senior officer present afloat or ashore (SOPA) regulations or the response to the logistics request (LOGREQ). For used HM which can be identified by a stock number, manufacturer and for which a MSDS is available in the HMIS, no MSDS need be provided to the receiving Navy activity. One may be required if transferring HM to a non-Navy activity or overseas. Used HM for which a MSDS does not exist in the HMIS or which has been open purchased shall be accompanied by a hard copy of the MSDS. In situations where compatible materials are inadvertently mixed, the ship shall include the MSDSs of each material in the mixture with the used HM. If the contents are unknown, the ship need not include a MSDS. However, they shall supply information, such as whether the material is flammable or combustible, reactive, toxic, or corrosive, in the "Special Stowage Requirements" item of the Used HM label to allow proper stowage at the receiving shore activity.

2. Navy shore activities shall only require that ships provide used HM that is properly packaged in the original container or in a container specified for the material in appendix C23-A. The container shall be properly secured and properly labeled with a properly filled out DD 1348-1 or DD 1348-1A and a MSDS, if the material originated outside the supply system or a MSDS is unavailable in the HMIS. Non-compliant material shall be returned to the originating ship. Receiving shore activities shall report problems experienced with material received from a ship to the command and, if flagrant or repeated, to the ship's immediate superior in command (ISIC). If any additional requirements (e.g., waste profile sheets) are placed on the

shore activity by Federal or State laws and regulations or by the supporting Defense Reutilization and Marketing Office (DRMO), the receiving shore activity **shall** ensure that these requirements are met using information supplied by the ship on the DD 1348-1 or DD 1348-1A and container label. When required, the shore activity shall charge analysis of unknown material to fleet accounts.

(c) **Excess HM**. A workcenter shall turn in full, properly sealed containers of usable HM in excess of its needs to the HAZMINCEN (or supply department if a HAZMINCEN is not installed). HAZMINCEN personnel shall determine if this material may be used elsewhere in the ship or if it exceeds the ship's needs. If the material exceeds the ship's needs, the ship shall transfer it to the supporting FISC with a properly completed DD 1348-1 or DD 1348-1A for each NSN of material being transferred.

C2303. HAZARDOUS MATERIAL MINIMIZATION CENTER

a. **General**. If established, the HAZMINCEN shall store and centrally control the issue of all HM with a SHML MMI of "Y" and collection of all HM for disposal for the ship.

b. **Functions**. The HAZMINCEN shall perform the following functions:

(1) Store HM in containers or compartments reserved and configured exclusively for HM. Bulk and infrequently used HM shall be stored in compliant storage spaces and only moved to the HAZMINCEN when necessary for replenishment and use.

(2) Make HM available to workcenters 24 hours a day.

(3) Record and control HM using the Navy-developed HICSWIN software in a manner that permits auditing of both the store inventory and the user.

(4) Restrict the amount of HM in use to the lowest level necessary for the work performance of ship workcenters. Workcenters may retain a 7-day quantity of SHML MMI "Y" HM used daily in suitable lockers.

(5) Provide optimal procedures and facilities for the turn-in of used HM, empty HM containers, and HM-contaminated items.

(6) Consolidate previously issued unused HM for either reuse or categorizing for alternate use.

(7) Properly process HM for safe offload/disposal.

(8) Coordinate procurement and receipt of authorized HM aboard.

c. **Facility**. The ship shall identify suitable space for use as the HAZMINCEN, based on the following guidance. This space shall have suitable protection in the event of a fire or spill of HM (see C2304 for HM storage precautions). The ship shall have appropriate personal protective equipment, adequate ventilation, sufficient shelving, and containment to store safely, segregate, and issue the various types of common-use HM used aboard. The space shall be sufficiently large and equipped to permit issuance of HM and consolidation of either used or unused HM, empty HM containers, and HM-contaminated items. The ship shall install a computer and peripherals needed to run the HICSWIN software in the HAZMINCEN's administrative office and not in the HM storage area. NAVSEASYSCOM has identified spaces for use as HAZMINCENs and administrative offices for most ship classes. Type commanders will provide guidance concerning interim HAZMINCEN spaces, including minor

modifications to ensure proper safety and health, until final spaces can be converted by SHIPALT.

d. **Manning**. Ships shall assign sufficient personnel to the HAZMINCEN to accomplish the functions listed in paragraph C2303b. Ships should use the HAZMAT Work Center listed in their Activity Manpower Document (AMD) as guidance for HAZMINCEN manning. If the ship's AMD does not list a HAZMAT Work Center, HAZMINCEN manning guidance should be obtained from the type commander. The supply department shall train all personnel assigned to the HAZMINCEN on their duties and responsibilities prior to assignment.

e. **Operation**. Reutilization and inventory management is a proven afloat methodology that establishes central control and management of ship's HM. It relies on a controlled HM issue/reuse site (HAZMINCEN) with HM inventory tracking by HICSWIN. This concept has worked successfully on both large and small surface ships. The following guidance is based upon installations of shipboard HAZMINCENs:

(1) **Startup**. The HAZMINCEN should reduce on board quantities of HM through inventory control and management. After a suitable HAZMINCEN facility(ies) is identified and prior to commencing operations, the ship must plan to systematically and incrementally assume management and inventory control of workcenter HM stocks throughout the ship (for HM normally managed by the HAZMINCEN (SHML MMI "Y")). This shall be accomplished by:

(a) Workcenter personnel in conjunction with HAZMINCEN personnel identifying and moving HM to the HAZMINCEN facility(ies). A maximum of 7-days use of HM may be entered into HICSWIN and reissued to the workcenter.

(b) Storing in compliant storerooms all HM beyond the capacity of the HAZMINCEN issue room.

(c) Moving ashore all ship's excess HM for redistribution or disposal per the procedures of C2302g.

Experience has shown that sufficient material should be available on board after these efforts to conduct HAZMINCEN operations and perform the preventive, corrective, and facilities maintenance needed to support ship operations.

During startup, it is highly likely that a large portion of the volume collected will be unusable due to material deterioration or expired shelf life, which cannot be extended. This material shall be transferred to the supporting shore activity for reuse or disposal. The initial collection of HM may include material not on the SHML. Retention of this material on board shall have to be justified or the material transferred ashore. If the material is required aboard, the SHML modification shall be requested per paragraph C2302b.

HAZMINCEN operators shall enter HM nomenclature, NSN, manufacturer's part number, unit of issue, stowage location, and other pertinent information into HICSWIN to initialize the inventory control system.

After the HAZMINCEN is in operation, the safety officer, HM coordinator, and master-at-arms force can initiate periodic surveys of ship spaces to account for all stores of HM so that it may be entered into HICSWIN. A 7-day's supply of HM may remain under the control and management of the workcenter(s) provided adequate stowage (e.g. flammable liquid storage cabinets) is available.

(2) **Operation**

(a) **Hours of operation**. The HAZMINCEN shall provide 24 hours of service to workcenter customers. The ship can accomplish this by establishing normal hours of store operation during ship's working hours and on-call service during other periods. The number of hours that the store should remain open will be dictated by experience, but shall be sufficient to support ship's maintenance and allow personnel to return unused HM, used HM, and HM-contaminated items during and at the end of the normal workday. Guidance on HAZMINCEN hours of operations may be available from type commanders based on experience on other ships.

(b) **HM delivery**. When workcenter supervisors require HM that is normally issued from the HAZMINCEN, they should provide that requirement to the HAZMINCEN. The following are request procedures that have been successful:

1. Phone-in HM request in advance for immediate pickup

2. Request turned in at the HAZMINCEN for pickup with a minimal wait

3. Request form filled out and submitted in advance of the requirement for immediate pickup the next day.

The system shall concentrate on being user-friendly, emphasizing paperwork reduction and ease of obtaining the material to do the work. The HAZMINCEN shall not require the user to submit a requisition for HM . Ships should consider paperless procedures, which require providing the necessary information verbally to the HAZMINCEN operator, but the user shall sign for the HM using a form generated by HICS.

The HAZMINCEN shall provide workcenter personnel with the amount of HM necessary to accomplish the job. If a worker needs only a pint of a solvent , only a pint should be issued; not a quart. The HAZMINCEN should, where possible, break down the volume issued using smaller containers. The HAZMINCEN shall mark these containers per paragraph C2302e prior to issue. Re-pour operations may not be an option for all HAZMINCENs due to space and safety limitations. Consult with the safety officer (or supporting industrial hygiene officer) to determine advisability of re-pour operations.

When HM is requested, the HAZMINCEN operator will consult the HICSWIN database to determine if the HM is available. If the HM is available, an issue transaction is accomplished and the HM is issued. If the material is not available, the HAZMINCEN shall requisition it from the ship's supply department. The HAZMINCEN shall account for the HM in HICSWIN upon receipt and issue it to the requesting workcenter. Material not on board will have to be requisitioned by the supply department using normal procedures.

Once a HAZMINCEN is in operation, the supply department shall not accept requisitions for or provide any SHML MMI “Y” directly to ship workcenters.

(c) **HAZMINCEN stock levels**. The HAZMINCEN HM stock levels will require establishment without historic use data. The HAZMINCEN shall survey workcenters to determine the amount and types of HM that they expect to use and they expect the HAZMINCEN to have on-hand. A review of Planned Maintenance System (PMS) and technical manual requirements for HM use will establish a credible basis for carrying the SHML MMI “Y” items aboard. Once usage data becomes available, the HAZMINCEN shall establish high and low (reorder point) stock levels for each HM it manages and shall strive to maintain levels above the low-level point. When the stock level of a HM

reaches a reorder point, HAZMINCEN shall obtain resupply from the supply department bulk stowage and repackaged as necessary into units of issue workcenters normally require.

(d) **HM return**. At the completion of a maintenance action, the end of the workday, or the end of a 7-day use period, workcenters shall return unused HM that was issued from the HAZMINCEN and its container as well as any residue from the maintenance action to the HAZMINCEN. Unused HM shall be consolidated with like material and appropriate inventory adjustments made in HICSWIN. Used HM shall also be consolidated with like material for offload per section C2302g. Empty containers free from contaminants shall be retained for future use with the same HM. Empty containers that are contaminated or cannot be reused shall be disposed of per the requirements of reference C23-3. Rags or other residual materials used with HM shall be processed aboard (if capable) or containerized for shore processing.

At the end of the workday, HAZMINCEN operators shall use HICSWIN to print a report of workcenters delinquent in returning unused HM or empty containers. They should vigorously seek out any material not returned.

(e) **Lessons learned**. Through operation of the HAZMINCEN on prototype ships, the Navy has learned the following lessons:

1. Failure to meet the demands of a workcenter for a HM will probably result in the stockpiling of the HM by the workcenter in the future.

2. HAZMINCENs must overcome resistance to change and mistrust of their ability to provide needed HM with exceptional response time, material availability, and reduction (to the greatest extent possible) of paperwork demands upon the customer. An around-the-clock operation is essential.

3. It is likely that large amounts of excess, expired, or used HM will be collected in the initial phases of implementation and will require off-loading to a shore facility. Space must be set aside to accommodate this material and advanced planning with the supporting shore facility is necessary to enable a smooth and rapid transfer of this material off the ship.

C2304. GENERAL STORAGE REQUIREMENTS

Observe the following general precautions to minimize hazards inherent in the handling and storage of HM:

NOTE:

Precautions are applicable to storage of HM in all locations.

a. Material normally thought to be safe may become hazardous under certain conditions. When containers leak or are heated, chemical reactions may result, leading to fire, explosion, or release of toxic reaction products. Consequently, stow chemicals in such a way that incompatible chemicals are segregated and separated.

b. Stow all large quantities of flammable and combustible liquids with a flashpoint less than 200^{o}F in flammable liquid storerooms, ready service storerooms, or issue rooms. Coolants, hydraulic fluids, lubricants, and aerosols shall also be stowed in one of the above. Use in-use flammable liquid cabinets within or near the workspace to stow a limited (7-day) quantity of flammable liquids used routinely on a daily basis. Do not use in-use flammable liquid cabinets to store more than 30 gallons of flammable liquid per space.

c. Post HM stowage locations with a CAUTION sign that states:

HAZARDOUS MATERIAL STORAGE AREA

Obtain these signs through the Navy supply system using National Stock Number (NSN) 9905-01-342-4851 (10" X 7") or 9905-01-342-4859 (3" X 5").

d. Permanently mount a label on lockers and cabinets used for in-use flammable and combustible liquids worded as follows:

FLAMMABLE/COMBUSTIBLE LIQUIDS

DURING STRIP SHIP CONDITION, THE CONTENTS OF THIS CABINET SHALL BE RELOCATED TO A FLAMMABLE LIQUIDS STOREROOM, ISSUE ROOM, OR READY SERVICE STOREROOM.

e. Ensure that HM stowage locations other than cabinets and lockers are equipped with supply and exhaust ventilation. Keep ventilation system in good operating condition. Any area to be used for HM stowage must first be evaluated by an industrial hygienist.

f. Restrict access to HM stowage locations to personnel authorized by the responsible division officer. **Entry to confined locations shall occur only after obtaining the gas free engineer's approval as specified in chapter B8 of this manual.**

g. Mark stowage compartments to identify type of HM stored and keep the compartment/materials clean and dry at all times.

h. Do not transfer material to any container that was previously used for a different material without first checking the materials' compatibility. If unsure, check with the HM Coordinator.

i. Stow incompatible materials in separate compartments to prevent mixing in the event of a spill. See appendices C23-C Hazardous Material Compatibility Storage Diagram and C23-F Incompatible Materials Chart. Appendices C23-D and C23-F provide information on stowage requirements based on the hazard characteristic code (HCC).

j. Stow HM only in containers that are compatible with the material (e.g. do not place corrosive materials in metal drums).

k. If space limitations necessitate storing incompatible materials in the same compartment, maintain a separation distance of at least 3 feet. This provides only limited protection, therefore use all precautions, such as a high coaming, to prevent accidental mixing. Coamings will not prevent vapors, generated from incompatible HM in spaces, from mixing and reacting.

NOTE:

Before using this exemption, consult the specific requirements of sections C2306 to C2311 that apply to the two incompatible materials for specific prohibitions (e.g. section C2309c(1)(a) prohibits the storage of calcium hypochlorite with flammable or combustible liquids).

l. Stack containers so that they will not crush lower containers, become imbalanced, or be difficult to access.

m. Use material on a first-in, first-out basis, considering shelf life.

n. Prohibit smoking, eating, or drinking in stowage areas.

o. Never permit open flames or spark producing items in HM stowage areas.

p. The gas free engineer shall monitor stowage compartments for oxygen depletion, suspect explosive atmospheres, presence of potentially toxic vapors, and CO_2 accumulation any time the question arises as to the safety of a stowage area.

q. Operate only explosion-proof electrical equipment in a potentially explosive environment.

r. Seal and protect all containers against physical damage and secure for heavy seas.

s. Maintain explosion-proof electrical fixtures in proper condition in applicable HM stowage areas.

t. Do not stow HM in spaces or locations that are not specifically authorized for HM stowage.

C2305. GENERAL HANDLING AND USE REQUIREMENTS

Observe the following general requirements when handling HM:

a. Work center supervisors shall ensure that, prior to using any HM, personnel under their supervision are trained on the hazards associated with that material, and that they have been provided with necessary protective clothing and equipment (i.e. eye protection, respirators, and gloves).

b. Workcenter supervisors shall ensure that adequate supply and exhaust ventilation is maintained in all spaces where HM is used, that such systems are in good operating condition, and that they have been evaluated as adequate by an industrial hygiene survey team. Keep ventilation intakes clear of HM at all times.

c. Never store excess supplies of HM in work areas. Return surplus material to the appropriate storage area or HAZMINCEN when not being used.

d. Handle incompatible materials in separate compartments to prevent mixing in case of a spill.

e. Never mix incompatible materials in the same collection containers.

f. Use appropriate personal protective equipment (PPE) when using HM.

g. Avoid contact with the eyes or prolonged contact with skin when using HM.

h. Prohibit smoking, drinking, or eating in areas where HM is used.

i. Ensure PPE (eye protection, respirators, gloves appropriate to the HM in use, etc.) is in good operating condition and is readily available to all personnel working with HM.

j. When mixing or pouring HM, eye protection shall consist of chemical goggles and full-face shields which have been cleaned and disinfected before being issued to another wearer.

k. Before entering spaces that have been closed for significant periods, have a gas free engineer determine that atmosphere is safe for entry.

l. Use an appropriately selected and fitted respirator when potentially exposed to harmful levels of particulate matter, hazardous gases, or vapors. When in doubt, consult the MDR for specific guidance in this regard or for a determination of the need for more stringent respiratory protection requirements.

C2306. FLAMMABLE AND COMBUSTIBLE MATERIAL

A flammable material is any solid, liquid, vapor, or gas that will ignite easily and burn rapidly with a flash point less than 1500°F. A flammable liquid is defined by the National Fire Protection Association (NFPA) as a liquid with a flash point below 100°F. Liquids having a flash point at or above 100°F are combustible liquids. Flammable liquids are more hazardous than combustible liquids since they can produce ignitable vapors in the typical shipboard environment without first being heated. All flammable and combustible liquids pose a danger to personnel and the ship, particularly those liquids having flash points below 200°F, since hot surfaces up to 200°F commonly occur aboard ship. Never carry flammable or combustible liquids aboard ship in quantities in excess of that required. Stow flammable and combustible liquids in approved locations. Dispense flammable and combustible liquids from shipping containers only into safety cans or other approved portable containers. Never use flammable or combustible liquids near a heat source or spark-producing device.

a. **Storage Requirements**

(1) Store flammable and combustible materials following the precautions listed in paragraph C2304.

(2) Store flammable and combustible materials separately from oxidizing materials (i.e., sodium nitrite, calcium hypochlorite, potassium permanganate, peroxides, and strong inorganic acids (nitric, hydrochloric, and sulfuric acids)). See appendices C23-C, Hazardous Material Compatibility Storage Diagram, and C23-F, Incompatible Materials Chart.

(3) Authorized storage locations for flammable and combustible materials are limited to the following:

Material	Location
(a) Liquids with flash points below 200 degrees Fahrenheit	Flammable liquids storeroom/ in-use flammable liquids stowage cabinet (in-use material only).

NOTES:

1. No in-use storage of these materials is allowed in machinery spaces.

2. In nuclear powered ships, small amounts of isopropyl alcohol (less than two quarts) may be stowed in a nucleonics room or secondary chemistry room cabinet.

Material	Location
(b) Solids and semi-solids which readily give off flammable vapors.	Flammable liquids storeroom

(c) Solids which burn with extreme rapidity because of self-contained oxygen.	Flammable liquids storeroom/ in-use flammable liquids stowage cabinet
(d) Materials which ignite spontaneously when exposed to air.	Flammable liquids storeroom
(e) All lubricating oils and petroleum products with a flash point greater than or equal to 200 degrees Fahrenheit but less than 1,500 degrees Fahrenheit.	Flammable liquids storeroom/ flammable liquids commercial cabinet (in-use material only)/Up to 12 Gals. within a coaming capable of containing the total amount stowed (in-use material only)

(f) Store cargo of the type described in (e) above, carried by **Cargo Ships and Oilers** in either a cargo hold under fixed HALON or CO_2 gas flooding or sprinkler protection or on the weather deck under protection from the elements. Normally stow used/excess HM aboard combat logistics force ships, carried for the purpose of easing used/excess HM stowage requirements of combatants or for retrograding such material to the continental U.S. (CONUS), on the weather deck under protection from the elements unless below decks cargo stowage for this material is available aboard the ship.

(g) Ensure ordinary combustible materials such as rags, paper and wood are not stowed in flammable stowage areas; however, oily rags should be stowed in these areas after being placed in suitable containers.

(4) Prohibit open flames or spark-producing items in flammable stowage areas.

(5) Ensure containers are secured with metal banding or other approved tie-downs vice nylon, polypropylene or manila line.

b. **Handling and Usage Requirements**

(1) Handle and use flammable and combustible materials per the precautions listed in paragraph C2305. Many flammable and combustible materials have additional hazardous properties (e.g. toxicity, see C2307).

(2) Never use a flammable material near a heat source or a spark-producing device. Do not smoke in an area in which flammable material is being used. Post spaces in which flammable materials are used as **NO SMOKING** areas.

(3) Keep scrapings and cleaning rags soaked with flammable or combustible liquids in a covered metal container. Do not leave scrapings and cleaning rags in a soaked state even in a covered metal container for longer than one work shift. Treat such materials as used/excess HM, containerize to prevent leakage, and properly label and store.

(4) Ensure that containers of partially used flammable materials are returned to proper stowage facilities, are tightly closed, and are properly labeled.

(5) Keep suitable fire extinguishing equipment and materials ready at all times for instant use.

C2307. TOXIC MATERIAL

A toxic material has the inherent capacity to produce personal injury or death through ingestion, inhalation, or absorption through any body surface. Toxic materials are considered, and often marked by the manufacturer as being,

poisonous. Avoid contact with toxic materials by the proper use of suitable impermeable protective clothing, respiratory protection, and by strictly following all prescribed safe-handling procedures. Solvents, degreasers, refrigerants, mercury, and hydraulic fluids are but a few of the toxic materials that may be found aboard ship. If stowed, handled, and used in the proper manner, they present little or no danger.

a. **Storage Requirements**

(1) Store all toxic material per the precautions listed in paragraph C2304. Many toxic materials have additional hazardous properties (e.g. flammability or combustibility, see C2306).

(2) Store all toxic material in cool, dry, well ventilated spaces separated from all sources of ignition, acids and acid vapors, caustics, and oxidizers. See appendices, C23-C Hazardous Material Compatibility Storage Diagram, and C23-F, Incompatible Materials Chart.

(3) Seal all containers and protect them against physical damage.

b. **Handling and Usage Requirements**

(1) Handle and use toxic materials per the precautions listed in paragraph C2305.

(2) Use appropriate gloves and protective clothing when handling sensitizers or potential skin irritants such as epoxy and polyester resins and hardeners where significant skin contact is likely. Only use protective skin cream to supplement, but not replace, the appropriate gloves for any operation where significant contact with potentially toxic/ irritant/sensitizing materials is likely.

c. **Halocarbons (Refrigerants)**. Liquid or gaseous halocarbons have multiple applications in the Navy. They are used as refrigerants, aerosol propellants, solvents, and dielectric fluids and as fire extinguishing and degreasing agents. Due to changes in the Clean Air Act, the use of halocarbons is being phased out; however, they are still used in the Navy. With common names of refrigerant R-11, R-12, R-22, R-113, R-114, and R-116, these products may be better known by names such as FREON , ISOTRON , FRIGEN , FLUORANE , FREON MF , FREON TF , GENSOLV D , BLACO-TRON TF , and ARKLONE P-113 .

(1) To minimize the size of spills, procure, store, and use halocarbons in the smallest amount and container possible for an operation.

(2) The Naval Supply System stocks all normally used halocarbons. Ships should procure halocarbons only through that system.

(3) Prohibit smoking and hot work in areas or vicinity where halocarbons are being used.

(4) Prohibit storage and consumption of food and tobacco in areas where halocarbons are being used.

(5) Some types of FREON are nearly odorless and can numb the sense of smell.

(6) Only use FREON-113 as a solvent when specified and when such use is essential.

(7)

d. **Toxic Cleaning Solvents**. Conduct shipboard operations involving toxic cleaning solvents in a manner which will not result in exposure of personnel to hazardous concentrations of airborne materials, significant or prolonged skin contact, the creation of a potentially explosive atmosphere, or reduce

oxygen levels below safe limits. Ensure spaces subject to accidental or uncontrolled concentration of toxic vapors are checked by a gas free engineer and certified safe for entry prior to beginning work. Use mechanical exhaust ventilation (explosion proof) to exhaust vapors overboard to prevent reentry and recirculation. Eliminate sources of ignition of vapors prior to ventilating such spaces. For normal cleaning operations:

(1) Whenever practicable, completely enclose the cleaning operation to prevent escape of vapors into working spaces.

(2) Ensure exhaust ventilation is available to remove or dilute the concentration of the vapors for the entire work period. If exhaust ventilation is not present to lower vapor concentration, use respiratory protection equipment.

(3) Wear gloves appropriate to the HM in use and chemical goggles, at a minimum, to protect the skin and eyes from exposure.

(4) Use chemical goggles and other protective clothing appropriate to the HM in use to protect the face, neck, arms, hands, and body when using acid or alkali cleaners.

e. **Trichloroethane** (also known as 1, 1, 1-Trichloroethane and inhibited methyl chloroform) is a halogenated hydrocarbon extensively used as a solvent for greasy films and oil deposits on machinery and other equipment. When properly used, its vapors have a low order of toxicity. However, vapors of this solvent, especially when sprayed or heated, will readily accumulate in confined spaces and increase the chance of harmful exposure. Trichloroethane is toxic if taken internally and when heated will decompose into products that may be more toxic.

f. **Mercury** represents a potential personnel health hazard if ingested, absorbed through the skin, or inhaled. Inorganic or elemental mercury can vaporize at room temperature in amounts hazardous to the health. In addition to health hazards, mercury may be damaging to materials and equipment. Mercury and its compounds are especially corrosive to certain non-ferrous metals and their alloys, such as aluminum, copper, and silver.

(1) **Mercury Storage**

(a) Store mercury and mercury compounds, including waste, in a cool, dry, well-ventilated area. The storage area shall be well away from sources of heat.

(b) Secure mercury containers to avoid accidental breakage or spillage, and keep in trays or shelves with a lip of sufficient height to contain the contents, if spilled.

(c) Store mercury and mercury compounds in their original containers, whenever possible. Tightly seal containers with a stopper or cap and keep closed when not actually in use. Label containers per paragraph C2302e.

(d) Clean up mercury or mercury compound spills immediately.

(e) Store small quantities of mercury in a NAVSEASYSCOM mercury storage locker, NAVSEA drawing number 803-5184175.

(2) **Mercury Use.** Personnel engaged in mercury handling shall:

(a) Wear protective clothing as necessary to prevent their skin and clothing from coming in contact with mercury. Such protective clothing includes rubber or plastic clothes, aprons or equivalent coveralls, and rubber-soled shoes or rubber boots.

(b) Remove all jewelry that could become contaminated with mercury.

(c) Not eat, drink, smoke, or apply cosmetics in a mercury handling area.

(d) Wash with soap and water immediately after working with mercury or mercury components, and prior to eating, drinking, smoking, or applying cosmetics.

(e) Carefully examine clothing after any mercury spill and at the end of each work session. Any clothing found to be contaminated with mercury or mercury compounds shall be cleaned of visible mercury, then removed, placed into double plastic bags and disposed of as mercury waste.

(f) Prior to handling or transporting any instrument or equipment containing mercury, seal, cap, plug, or double-bag the item in plastic to prevent spillage.

(g) Immediately and properly clean up spilled mercury.

(h) Not use compressed air for cleaning up spilled mercury.

(i) Avoid allowing mercury to contact hot surfaces that could accelerate vaporization and increase the inhalation hazard.

(j) Decontaminate equipment used in handling mercury after each work session.

g. **Polychlorinated Biphenyls**

(1) In general, PCBs, if properly managed, do not present a major health hazard. The Environmental Protection Agency banned PCBs in most manufacturing processes in 1979. However, PCBs may be found as a fire retardant in many materials used in ship construction where stocks of PCB material purchased prior to the ban were consumed. Some examples of shipboard materials used in ship construction which may contain PCBs include: sound dampening on reduction gears; electrical cable insulation; foam hull insulation; rubber (used as banding and sheet rubber for cableways, pipe hanger liners, isolation mount, and vent gaskets); packing and grommets for electrical cable stuffing boxes; and pipe insulation and lagging.

NOTE:

PCB-containing construction materials installed in Navy ships need not be removed because they contain PCBs. Installed PCB-containing construction materials normally need not be labeled.

(2) Label PCB-containing electrical/electronic components (primarily capacitors) per the guidance provided in reference C23-4. Label PCB-contaminated tools and waste materials (such as dust from ventilation ducting which are known to contain PCB-impregnated felt gaskets) per paragraph C2307g(4)(c).

(3) With the exception of ventilation duct cleaning, work involving known or potential PCB-containing materials shall normally be accomplished in port. Obtain assistance through the nearest naval shipyard environmental program office, Navy medical treatment facility, or NAVENPVNTMEDU prior to such action.

(4) For situations not involving unprotected PCB skin contact, employ routine work and personal hygiene measures (such as washing hands and other exposed skin surfaces with soap and water when work is completed) appropriate for any occupational setting.

(a) When working with PCB-impregnated materials such as insulating felts or with articles that contain liquid PCB solutions, strictly observe good housekeeping procedures to avoid the possibility of secondary surface contamination.

(b) Personnel involved in PCB-related work activities shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the space in which work is being performed.

(c) Collect and dispose of PCB-containing waste, scrap, and debris; dust collected from ventilation systems known or suspected of containing PCB-impregnated felt gaskets; and PCB-contaminated clothing (consigned for disposal) in sealed impermeable containers specified in appendix C23-A and labeled with the large label described in appendix C23-E. Disposal should be per the procedures of section C2302g. Specifically notify the receiving activity that PCBs or material containing PCBs is being transferred.

(d) When PCBs or PCB-containing material are sufficiently heated they will decompose into products that are more toxic than PCBs. Do not perform hot work in the immediate area when work is performed with PCBs or PCB-containing material. Do not perform hot work, including welding, torch cutting, brazing, grinding, and sawing on ventilation systems components within 12 inches of either side of a flange containing felt gaskets.

(e) Specific work practices for the removal and handling of PCB felt, maintenance and cleaning of ventilation ducting containing PCB felt, and maintenance and handling of other shipboard PCB materials are provided in reference C23-4.

(f) Label all reusable cleaning equipment employed in cleaning systems potentially contaminated with PCBs with PCB labels described in appendix C23-E. Use the large label whenever practicable. If the large label does not fit, use the small label. Equipment to be labeled includes vacuum cleaner, vacuum hoses and working end tools, brushes, Vent Duct Cleaning System components, dust pans, scrapers, and putty knives. Label; bag, where possible; and stow this equipment in a location where it will not be accidentally used for other purposes.

(5) The baseline industrial hygiene survey shall specify personal protective equipment and medical surveillance for any potential PCB-related work.

C2308. CORROSIVE MATERIALS

Corrosive materials are chemicals such as acids, alkalis, or other liquids or solids which, when in contact with living tissue, will cause severe damage to such tissue and/or metals by chemical action. In case of leakage, corrosive material may materially damage surfaces or cause fire when in contact with organic matter or with certain chemicals.

a. Storage Requirements

(1) Store all corrosive materials per the precautions listed in paragraph C2304.

(2) Store corrosive materials in their properly labeled, original containers.

(3) Ensure that acids and alkalis are stowed separately from each other.

(4) Ensure corrosive materials are not stored near oxidizers or other incompatible materials. See appendices C23-C Hazardous Material Compatibility Storage Diagram and C23-F Incompatible Materials Chart.

b. **Handling and Usage Requirements**

(1) Handle and use corrosive materials per the precautions listed in paragraph C2305 or as directed by Maintenance Requirement Card, NSTM, industrial hygiene survey, or manufacturer's instructions.

(2) As a minimum, wear chemical goggles, full-face shields, and rubber gloves when handling acids or other corrosive materials. Greater protection may be required as specified by Maintenance Requirement Card, NSTM, industrial hygiene survey, or manufacturer's instructions.

(3) Never allow corrosive materials or their vapors to come in contact with the skin or eyes.

c. **Inorganic Acids**

(1) Stow liquid inorganic acids, such as hydrochloric, sulfuric, nitric and phosphoric acids bottled in glass or plastic in such a manner that they are cushioned against shock. They should be kept in their original shipping carton inside suitable acid-resistant lockers, cabinets or chests, located in storerooms below the full-load waterline. Except where stowed in chests or lockers, the lower part of the bulkheads where acids are stored shall be provided with a watertight acid-resistant rubber lining.

(2) Maintain hydrofluoric acid in acid-proof polyethylene or ceresin-lined bottles at all times and never allow them to come in contact with skin or eyes.

(3) Stow medical acids in acid resistant containers in the medical storeroom.

(4) Do not stow inorganic acids in flammable liquid storerooms, except when contained within an acid stowage locker. Since many inorganic acids are oxidizers, stowage in a flammable liquid storeroom, even in an acid locker, should be avoided.

d. **Organic Acids**. Do not permit liquid and solid organic acids, such as glacial acetic, oxalic, carbolic, cresylic, and picric acids to come in contact with the eyes or skin. These acids are corrosive to aluminum and its alloys, to zinc, and to lead. Keep these acids, usually packaged in glass bottles, from freezing and physical damage. Stow these acids in a locker lined with acid-resistant material in the flammable liquids storeroom separated by a partition, or by at least 3 feet, from all other material.

e. **Alkalis**. Stow alkalis (bases), such as sodium hydroxide, trisodium phosphate, sodium carbonate, potassium hydroxide, lithium hydroxide, and ammonium hydroxide (ammonia water) in designated lockers, cabinets, or chests. Keep alkalis separated from acids, oxidizers, and other incompatible materials. Ensure the stowage area is dry.

NOTE:

Many shipboard cleaning agents and laundry materials contain alkalis in very strong concentrations. Observe specified stowage and handling precautions for these materials.

C2309. OXIDIZERS

An oxidizer is any material, such as chlorate, perchlorate, permanganate, peroxide, nitrate or nitrite which yields oxygen readily to support the combustion of organic matter, or which may produce heat, or react explosively when it comes in contact with many other materials. Higher temperatures increase the possibility of oxygen release from oxidizers and the possible initiation of fire. Heat shall be avoided when handling and storing oxidizers.

a. **Storage Requirements**

(1) Store oxidizers following the precautions listed in paragraph C2304.

(2) Do not store oxidizers in an area adjacent to a magazine or heat source or where the maximum temperature exceeds 100 degrees Fahrenheit under normal operating conditions.

(3) Ensure that oxidizers are not stored in the same compartment with flammable or combustible materials such as fuels, oils, solvents, grease, paints, or cellulose products. See appendices C23-C, Hazardous Material Compatibility Storage Diagram, and C23-F, Incompatible Materials Chart.

b. **Handling and Usage Requirements**

(1) Handle and use oxidizers per the precautions listed in paragraph C2305.

(2) Do not use oxidizers in an area where they might mix with flammable or combustible materials (i.e., fuels, solvents, oils, grease, paints, or cellulose products).

(3) When transferring oxidizers to second containers, **ensure that the second container is compatible with the oxidizing material**. Place appropriate warning labels on the second container.

(4) Do not remove or obliterate warning labels from containers.

(5) Ensure oxidizing materials are only handled or used by authorized personnel.

c. **Calcium hypochlorite** is a very strong oxidizer used to provide the sanitizing and bleaching property of chlorine without requiring the handling of gaseous chlorine.

(1) The following precautions apply to the stowage of calcium hypochlorite:

(a) Stow the ready usage stock of 6-ounce bottles issued to the medical and engineering departments in a locked box mounted on a bulkhead, preferably in the cognizant department office space. Do not, under any circumstances, install the box in a machinery space, flammable liquids storeroom, berthing space, storeroom, or in the oil and water test laboratory areas. A metal box such as a first aid locker is recommended for this purpose. Drill three vent holes in the bottom of the box, each 1/4-inch in diameter, to allow the release of any chlorine products. (The metal box is a standard stock

item, readily available, is relatively inexpensive and requires only repainting to be suitable). No more than 3 days supply of calcium hypochlorite shall be maintained in ready usage stock at any one time. Only 6-ounce bottles are to be used as ready usage. Do not use 3-3/4-pound bottles of calcium hypochlorite as ready usage stock.

(b) Stow ready usage stock for sewage disposal treatment in steel or aluminum cabinets or racks located on a bulkhead in the macerator-chlorinator space. Do not stow paints, oils, greases, or combustible organic material in this space. Equip cabinets or racks with shelving and retaining bars to secure the individual containers.

(c) Stow storeroom stocks in labeled, ventilated lockers, or bins. Locate these lockers or bins in an area where the maximum temperature will not exceed 100 degrees Fahrenheit under normal operating conditions and which is not subject to condensation or water accumulation. The area shall not be adjacent to a magazine, and the lockers and bins shall be located at least 5 feet from any point heat source or surface that may exceed 140 degrees Fahrenheit. Do not locate these lockers in an area used for stowage of paints, oils, greases, or combustible organic materials. Do not stow more than 48 6-ounce bottles or 36 3-3/4-pound bottles in any individual locker or bin. Only issue calcium hypochlorite to personnel designated by the medical or engineer officer.

(d) Stow calcium hypochlorite, carried as cargo, in a separate enclosure constructed of steel or expanded metals. Ensure that the enclosure has a secure door. Do not locate the enclosure in an area used for stowing paint, oils, greases, or other combustible materials. Locate the enclosure in an area where maximum temperature will not exceed 100 degrees Fahrenheit under normal operating conditions and is not subject to condensation or water accumulation. Do not locate the enclosure adjacent to a magazine and within 5 feet from any point heat source. Sprinkler protection is not required but need not be avoided. For unpalletized material, equip the enclosure with shelving and retaining bins to contain securely the individual boxes.

(e) Label all lockers, bins, and enclosures with red letters on a white background:

HAZARDOUS MATERIAL, CALCIUM HYPOCHLORITE

(2) The following precautions apply when using calcium hypochlorite:

(a) Mix only with water.

(b) Do not allow calcium hypochlorite to come into contact with paints, oils, greases, wetting agents, detergents, acids, antifreeze, alkalis, or combustible materials.

(c) Do not remove or obliterate warning labels.

(d) Dispense only in clean, dry utensils and only in amounts required for immediate use.

(e) Avoid contact with skin and eyes.

(f) Ensure containers are not used for any other purpose.

(g) Do not mix with materials containing ammonia.

(h) For external contact or if taken internally, follow the instructions printed on the container label or in the MSDS.

(i) No special firefighting precautions are required for fires caused by calcium hypochlorite.

d. **Organic Chlorine Laundry Bleach**. This bleach contains an organic chlorine-liberating compound and was selected as a less hazardous material to replace calcium hypochlorite as laundry bleach. However, under conditions of high heat and humidity, organic chlorine laundry bleach emits vapors that can be hazardous to personnel. Stow this bleach in a cool, dry place as far from conditions of high heat and humidity as possible. Do not mix with materials containing ammonia.

C2310. AEROSOLS

Materials in aerosol containers: An ever-increasing demand exists for pressurized (aerosol) dispensers for the application of paints, enamels, lacquers, insecticides, inspection penetrant kits, lubricating oils, silicones, and rust preventatives. The aerosol propellants may be low boiling hydrocarbons that are flammable, such as propane or isobutane. The contents of the aerosol-type pressurized containers are under pressure, and exposure to heat may cause bursting of the dispensers. The propellants in higher concentrations may be anesthetic, asphyxiating, and extremely flammable. The decomposition products formed when propellants contact open flames or hot surfaces may be corrosive, irritating, or toxic.

a. **Storage Requirements** (except for personal hygiene and shaving products)

(1) Stow aerosols following the precautions listed in paragraph C2304.

(2) Ensure that inside stowage of aerosols is in the flammable liquid storeroom. See appendices C23-C, Hazardous Material Compatibility Storage Diagram, and C23-F, Incompatible Materials Chart.

(3) Stow ship's stores aerosol stock items in the flammable liquid storeroom.

(4) Do not stow containers in areas with temperatures above 120 degrees Fahrenheit or adjacent to steam lines, hot zones, or heat sources.

(5) Limit ready-usage stocks of any one product located at work areas to 7-days supply.

b. **Handling and Usage Requirements**

(1) Handle and use aerosols per the precautions listed in paragraph C2305.

(2) Never use aerosols near a heat source or a spark-producing device. Do not smoke in the area in which aerosol material is being used.

(3) Keep aerosol containers away from steam lines, electronic equipment, hot water, and other heat sources.

(4) Avoid prolonged exposure of aerosol containers to sunlight.

(5) Avoid prolonged or repeated inhalation of aerosol spray or vapors of residual liquid.

(6) Do not disperse aerosol spray near flames, hot surfaces or ignition sources due to potential hazards from thermal decomposition products.

(7) Ensure food or tobacco products are not contaminated with spray.

(8) Avoid accumulation of wetted rags or clothing that may be subject to spontaneous heating or ignition. Ignition may be initiated by the temperature of low-pressure steam pipes, the surfaces of incandescent light bulbs, sunlight, or any other heat source.

(9) Avoid accumulation of aerosol or flammable concentrations of aerosol spray or vapors in the air.

(10) Use aerosols containing material with a flash point less than 73 degrees Fahrenheit on board ship only when required for a specific use and authorized by the cognizant division officer.

C2311. COMPRESSED GASES

Aboard Navy ships, numerous cylinders of compressed gases will be found. Compressed gases are used for welding operations (oxygen and acetylene), in refrigeration and air conditioning systems, and for purging various systems (nitrogen). Cylinders of compressed gases are potential explosion, fire, and health hazards if strict compliance with existing requirements is not met.

a. **Storage Requirements**

(1) General

(a) Only stow compressed gases, with the exception of flammable and explosive gases and ready service cylinders, in compartments designated for cylinder storage, as shown in applicable plans for each ship. Whenever practical, stowage shall permit removal of any cylinder without disturbing other cylinders. Such compartments shall:

1. Be kept free of all flammable and combustible materials (especially greases and oils).

2. Be maintained at temperatures below 130 degrees Fahrenheit.

3. Have instructions posted at all entrances requiring ventilation of the compartment for a period of at least 15 minutes prior to entry.

(b) Securely fasten each individual cylinder in the vertical position (valve end up) by metal collars and with horizontal restraints to meet Grade "B" shock mounting requirements.

(c) Stow cylinders by date of receipt, and place into service in the order of receipt.

(d) Tag empty cylinders **EMPTY**, or mark **MT**, and segregate from full or partially full cylinders.

(2) Oxygen

(a) Only stow oxygen cylinders in designated, well-ventilated spaces except as noted in paragraph C2311a(4)(b).

(b) Conduct an atmospheric analysis prior to entry into any sealed compartment where oxygen is stowed as specified in chapter B8.

(3) Flammable and Explosive Gas Weather Deck Stowage. Unless approved below-deck stowage locations are shown on a ship's plan, all flammable and explosive gas storage shall be on the weather deck. Take the following precautions, in addition to those in section C2311a(1) when storing flammable or explosive gasses on the weather deck:

(a) Never stow oxygen bottles in close proximity to fuel gas cylinders.

(b) Screen cylinders from the direct rays of the sun.

(c) Protect cylinder valves during winter months from accumulations of snow and ice.

(d) Make every effort to prevent corrosion of threaded connections on cylinders. However, under no circumstances use grease or flammable corrosion inhibitors on oxygen cylinders.

(e) Ensure stowage areas are as remote as possible from navigating, fire control, and gun stations.

(f) Keep all flammable materials, especially greases and oils, out of the stowage area.

(4) Ready Service

(a) The following gas cylinders, when in use or staged for use, are permitted below decks outside of stowage compartments:

1. Fire extinguishers (portable)

2. Fire-extinguishing cylinders permanently connected to fixed fire-extinguishing systems

3. Gas and chemical canisters for oxygen breathing apparatus

4. Welding cylinders

5. Medical gas cylinders

6. Cylinders containing refrigerants

7. Disposable cylinders supplied as repair kit accessories (halide leak detector kits, for example).

(b) Welding Cylinders. Observe the following special instructions and precautions regarding oxygen and fuel gas cylinders in ready service:

1. Install cylinders of gas necessary to equip each authorized shop and repair locker in accordance with approved plans or specifications.

2. Fasten cylinders securely in a rack (stationary or wheeled). Ensure acetylene cylinders are always stowed vertically. Securely fasten the rack, in turn, to the bulkhead at the designated locations.

3. Never leave equipment unattended.

4. Return welding units to designated stowage as soon as work is complete.

5. Post the following warning at each designated stowage location:

WARNING

NOT SECURE

Unit is **NOT SECURE** while pressure shows on gauges, or when cylinders are not firmly fastened to rack or to bulkhead, or when rack is not firmly fastened to bulkhead. If removed from this location, constantly attend this unit until returned and secured.

6. Attach a card to each welding unit with the following instructions:

Return to (designated location) immediately on completion of work. Do not leave unit unattended while away from above location. Unit is **NOT SECURE** while pressure shows on gauges, or cylinders are not firmly fastened to rack, bulkhead, or stanchion.

b. **Handling and Usage Requirements**

(1) Never drop cylinders nor permit them to strike against one another violently.

(2) Never use a lifting magnet or a sling (line or chain) when handling cylinders. If a crane or hoist is used, provide a safe cradle or platform to hold cylinders.

(3) When returning empty cylinders, be sure that valves are closed and that valve outlet, if provided, and cylinder valve protection caps are in place.

(4) Be sure that all cylinders in the ship's stores are approved under Department of Transportation (DOT) regulations. Non-magnetic cylinders are an exception.

(5) Refill cylinders only when such action is specifically approved by the command.

(6) Fill a cylinder only with the gas for which the cylinder has been specifically designated.

(7) Do not remove or change the numbers or marks stamped into cylinders without the specific approval of the Defense General Supply Center.

(8) Never use cylinders for rollers, supports, or for any purpose other than to carry gas.

(9) Never tamper with the safety devices on valves or cylinders.

(10) Never hammer or strike the valve wheel in attempting to open or close valves. Use only wrenches or tools provided and approved for this purpose.

(11) Be sure that the threads of regulators or other auxiliary equipment are the same as those on cylinder valve outlets. Never force connections that do not fit.

(12) Do not use regulators, pressure gauges, manifolds, and related equipment that are provided for a particular gas on cylinders containing different gases.

(13) Repair or alter cylinders or valves only when authorized by NAVSEASYSCOM.

(14) Unless specifically authorized, never subject compressed gas cylinders, either in stowage or in service, to a temperature in excess of 130 degrees Fahrenheit. Do not allow a direct flame to come in contact with any

part of a compressed gas cylinder. For carbon dioxide extinguishers in spaces above 130 degrees Fahrenheit, see NSTM 555.

(15) Protect cylinders from objects that will cut or otherwise abrade the surface of the metal.

(16) When testing for leaking gas cylinders, use soapy water or leak-detection compound conforming to MIL-PRF-25567E.

(17) Only use a gas cylinder that is properly marked (by color of paints or with the name of the gas stenciled on cylinder and valve). Return all mis-marked cylinders to the nearest Naval Supply Depot.

(18) Work center supervisors shall ensure that supply and exhaust ventilation exists in compartments where compressed gases are stored or in use, systems are in good operating condition, and have been evaluated as adequate by an industrial hygiene survey team.

(19) To thaw out valve outlets that are clogged with ice, use warm (not boiling) water. The use of boiling water will melt the fusible plugs, if present, and vent the cylinders.

(20) Never discharge a cylinder into any device or equipment in which the gas will be entrapped and create pressure. The only exception is a cylinder equipped with a pressure regulator set to control the pressure.

(21) Never use oil-tolerant gases when oil-free gases are required. This practice is discouraged by the fact that valve outlets are not interchangeable, however, there have been cases in which this safety feature has been overcome by homemade adapters.

c. **Recharging Cylinders Aboard Ships**

(1) Recharge only oxygen, nitrogen and carbon dioxide cylinders, except as noted in paragraph C2311c(2).

(2) Ensure that the recharging is supervised by a graduate of the Fleet Training Center Cryogenics School.

NOTE:

Small cylinders of hydrogen routinely used for nuclear propulsion plant operations may be refilled without a graduate of Cryogenics School being present.

(3) Recharge a cylinder only if less than 5 years have passed since its last hydrostatic test date. The only exceptions are 3A and 3AA cylinders having water capacities under 125 pounds, for which a 10-year hydrostatic test frequency is approved. For fire extinguisher and fire extinguishing system cylinder hydrostatic test requirements, see NSTM Chapter 555.

(4) If evidence of oil or grease above the neck ring is present, do not recharge oxygen cylinders.

(5) Before recharging, sniff-test each cylinder for evidence of contamination by a foreign gas. Oxygen and oil-free nitrogen cylinders should be odorless. An oily odor from these cylinders indicates hydrocarbon contamination. Do not recharge contaminated cylinders.

(6) Keep shipboard oxygen cylinders (aviators' breathing oxygen) and nitrogen cylinders dry by not allowing the cylinder pressure to go below 25 lb/in^2g. Consider a cylinder wet if there is insufficient internal pressure to cause a hissing noise when the valve is opened.

CHAPTER C23

REFERENCES

C23-1 OPNAVINST 5090.1B, Environmental and Natural Resources Program Manual (NOTAL)

C23-2 NAVSUPINST 4410.52B, Shelf-Life Item Identification, Management, and Control (NOTAL)

C23-3 OPNAV Publication P-45-114-95, CNO Policy Guide for Shipboard Hazardous Material Container Disposal (NOTAL)

C23-4 NAVSEA S9593-A1-MAN-010, *Shipboard Management Guide to PCBs* and associated NAVSEA issued PCB Advisories (NOTAL)